102T136

TEKGARD, Inc.

Unitary Environmental Control Unit

Model #: TEK-U24A2
Part #: U24-T109

Safety, Operation and Maintenance Manual

Cage Code 3C0M7	3390 Farmtrail Road ■ York, PA 17406 Phone 717-854-0005 ■ Fax 717-854-0045	Rev C	10 December 2012

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Revisions

Revision	Release Date	Description	Released By
A	15 July 2012	Initial Release	JHC
B	01 September 2012	Revised Refrigeration Schematic, ICD and parts list.	JHC
C	12 December 2012	Added High Temperature Cut-Out reset instructions	JHC

All information in this manual is based on the latest product information at the time of publication. However, specifications and procedures are subject to change without notice.

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SAFETY

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Safety

The items listed in this section are general safety guidelines. They are provided as information to be used in the absence of related policies and procedures.

DO NOT SERVICE OR ADJUST ALONE

Under no circumstances should any person reach into an enclosure for the purpose of servicing or adjusting the equipment except in the presence of someone who is capable of rendering aid.

The US EPA Clean Air Act of 1994 requires personnel working with refrigerants to be certified to the current standards of Section 608.

RESUSCITATION

Personnel working with or near high voltages should be familiar with modern methods of resuscitation. CPR information and training can be obtained from your local Red Cross or American Heart Association.

KEEP AWAY FROM LIVE CIRCUITS

Personnel must at all times observe all applicable safety regulations. Do not remove or replace components with power turned on. Dangerous potentials may exist even when power is set to the OFF position. To avoid injury to personnel, always remove power by disconnecting power cable, and then use test equipment to confirm that a high voltage circuit is at ground potential before touching it.

ABNORMAL CONDITIONS

In the event of an abnormal condition not covered by the procedures in this manual, stop work and consult a qualified technician before continuing work.

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LIFTING OPERATIONS

Use extreme care and utilize a forklift or crane when lifting or moving units or heavy components. Stand clear during all lifting operations.

VENTING REFRIGERANTS

The U.S. Clean Air Act Amendments of 1990 prohibit venting refrigerants to the atmosphere. The objectives of this Act are to reduce the use and emissions of such substances to the lowest achievable level and maximize the recapture and recycling of such substances. In addition, the amendments establish new standards for the safe disposal of these substances. All emissions must be captured in a suitable container for further recycling or safe disposal. Service personnel or any other individual may **not** "**knowingly vent or otherwise release or dispose of any substance used as a refrigerant in such appliances in a manner which permits such substance to enter the environment**." It is the customer's responsibility to keep informed of the latest Amendments to this Act.

SMOKING AND OPEN FLAMES

Smoking or open flames should not be permitted within 50 ft. (15m) of refrigerant vapors.

HIGH PRESSURE SYSTEM

The unit has a closed-loop, high-pressure refrigerant system. Do not close, open or adjust valves in the refrigerant system unless a specific instruction states that valves must be opened, closed or adjusted. Personnel could be injured or equipment could be damaged.

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DESIGN PARAMETERS

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GENERAL

This manual defines Environmental Control Unit (ECU), Tekgard model TEK-U24A2, Part Number U24-T109. This model is a mobile shelter type ECU. The basic design of the ECU is a self-contained electric motor driven, air-cooled unit. Total system capacity is 22,000 BTU/HR at an ambient temperature of 130°F or 25,000 BTU/HR at an ambient temperature of 120°F.

DESIGN PARAMETERS

The ECU is designed to meet the following requirements for physical dimension, weight, mobility, power requirements, and performance.

COOLING

Total Cooling Capacity:	22,000 BTU/HR @ 130°F
Maximum Ambient Temperature:	+131°F
Minimum Ambient Temperature:	0°F
Design Return Air Dry Bulb Temperature:	+90°F
Design Return Air Relative Humidity:	50% RH Max
Approximate Supply Airflow Rate:	800 CFM @ 0.25" ESP

HEATING

Total Heating Capacity:	4.0Kw
Minimum ambient Temperature:	-50°F

PHYSICAL DIMENSIONS

Height:	22.50"
Width:	29.94"
Depth:	30.00"
Weight:	234 Lbs.

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DESIGN PARAMETERS (cont'd)

POWER REQUIREMENTS

Voltage:	208 Volts Tolerance Recommended ±10%
Number of Phases:	3 Phase
Frequency:	50-60 Hz
Maximum Power Draw:	5.76 kW
Control Circuit:	24 VDC (Derived from power supply)
Refrigerant:	R-407C
Charge:	3 Lbs. 13 oz. ± 8 oz.

COMPONENT SETTINGS

TXV Setting - Super Heat	Factory set between 5°F to 12°F
Sub Cooling	Factory set between 10°F to 18°F
Low Pressure Cut Out Switch	5 psig
High Pressure Cut Out Switch	500 psig
High Pressure Relief Valve	555 psig
Hot Gas Bypass Valve	Factory Set @ 55 psig
Heater Hi Temp Cut Out Switch	180°F

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THEORY OF OPERATION

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THEORY OF OPERATION

The ECU is designed for operation with an electronics equipment shelter system. The system is equipped with an analog or digital remote control unit. The Mode Selector Switch on the remote control allows the user to select HEAT – OFF – VENT – COOL.

With the selector switch in the COOL position, the thermostat can be adjusted by rotating the dial (or using the touch keys if digital remote control) to set the desired temperature for the conditioned space.

The circulation fan runs continuously when in the Mode Selector Switch is on the HEAT, VENT, or COOL setting. Extreme high internal shelter temperature will cycle the Circulation Fan

NOTE: At no time will the compressor and the heating elements be energized at the same time.

MODE SELECTOR SWITCH

When the Mode Selector Switch is in the OFF position, all functions of the ECU are stopped.

WARNING

The OFF position does NOT disconnect line voltage from the unit. 208 VAC is still present on the line side of the contactors and the 24VDC control power is live.

COOLING

When the Mode Selector Switch is in the COOL position, the circulation fan is energized, the condenser fan is energized, and the compressor is energized. The Condensing Fan does not operate continuously depending on local ambient temperatures. It is controlled to cycle on and off based on the refrigerant pressure. What appears as "short cycling" is normal and expected especially in low ambient environments.

The Unloader Valve, the High Pressure Relief Valve and Thermal Expansion Valve (TXV) in the refrigeration circuit will work in conjunction with the thermostat to satisfy the temperature setting and maintain a maximum of 50% relative humidity.

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HEATING

When the Mode Selector Switch is in the HEAT position, the circulation fan is energized, and the heating element is energized intermittently in response to the control signal received from the thermostat. In the HEAT position, the circulation fan is energized and the heating element (4.0kW) is energized intermittently in response to the control signal received from the thermostat. If the air temperature in the shelter returning to the ECU is below the thermostat set point, the heating element is energized. If the air temperature in the shelter returning to the ECU is above the thermostat set point, the element is de-energized.

HI-TEMP PROTECTION

The heating elements have a high temperature safety switch mounted in close proximity. The bi-metal disc will de-energize the heaters in the event air flow is interrupted or any other event causes the temperature of the heaters to rise above a safe preset temperature.

Note: If the temperature reaches an unsafe level the HIGH TEMPERATURE CUT-OUT will trip. After resolving the cause of the high temperature the CUT-OUT will need to be manually reset. When resetting the CUT-OUT turn the MODE SELECTOR SWITCH to the OFF position before returning to the HEAT MODE. This will communicate to the software program that the fault has been corrected. (See page 27 for the CUT-OUT location)

CONTACTORS

Contactors are used to turn on and off the compressor, heaters and fan motors. Motor Starter Protectors or Circuit Breakers are used to protect the load device. The compressors and fan motors have internal thermal overload protection and the heater stages have high temperature cutout switches.

Contactors have a set of high current carrying contacts for conducting line voltage to the load and a magnetic holding coil, which closes the line voltage contacts whenever the control circuit voltage (24 VDC) is applied.

FAN MOTORS

Circulating Fan Motor	230V, 60HZ, 3Ø, .58 kW Thermally Protected
Condensing Fan Motor	230V, 60HZ, 1Ø, .35 kW Thermally Protected

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ELECTRICAL WIRING

The wiring of the unit and the control panel is described in the wiring schematic mounted on the inside of the electrical service panel. The schematic is also shown in the ***Drawings & Schematics*** section of this manual.

REFRIGERATION SYSTEM

The refrigeration circuit of the unit is described in the refrigeration schematic diagram mounted on the inside of the main service panel. The diagram is also shown in the ***Drawings & Schematics*** section of this manual.

COMPRESSOR

The compressor circulates refrigerant through the system by creating a pressure differential. The increase in pressure through the compressor is also necessary in order for the condenser to function.

High and low pressure cutout switches are connected to the compressor at appropriate pressure taps. These devices prevent unsafe operation.

CONDENSER

The condenser is an air cooled heat exchanger. It is designed to lower the temperature of the refrigerant that is being discharged by the compressor. This is in the form of a high pressure/high temperature vapor. A properly sized and functioning condensing coil will have little effect on the pressure; however the temperature of the refrigerant will lower enough to cause the refrigerant to condense into a liquid.

FILTER DRIER

The filter drier removes solid contaminants such as metal filings and brazing slag from the system. It also removes soluble contaminants such as moisture and acid that could damage sensitive components in the system.

Note: The filter drier should be replaced any time the system is opened to the atmosphere.

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SIGHT GLASS

The sight glass is helpful when determining if the system is properly charged with refrigerant or contains moisture.

THERMOSTATIC EXPANSION VALVE

The thermostatic expansion valve (TXV) is a modulating valve that regulates the flow of refrigerant through the system. It is controlled by two measurements taken at the discharge of the evaporator coil. The first measurement is the temperature of the refrigerant leaving the coil. The second measurement is the pressure leaving the coil. The relationship between these two measurements is called the "superheat". The valve is adjusted at the factory to modulate the valve so the superheat is maintained in an optimal operating range.

EVAPORATOR

As the refrigerant passes through the TXV, its pressure is reduced allowing the refrigerant to expand and reduce temperature. As the refrigerant passes through the evaporator coil it continues to expand and reduce its temperature. Gradually the refrigerant changes from a liquid to a gas.

The evaporator is a heat exchanger designed to allow the refrigerant to absorb the heat from the circulation air from the shelter. As the circulation air gives up its heat to the refrigerant, the refrigerant "boils" from a liquid to a gas and the circulation air temperature is lowered.

VIBRATION ISOLATORS

Vibration isolators have been installed in the copper tubing. This will reduce transmission of compressor-induced vibration through the system. The vibration isolators are located on the compressor inlet and outlet lines.

RECEIVER TANK

Liquid refrigerant enters the receiver tank after it leaves the condenser.

The receiver tank serves the purpose of keeping a consistent liquid flow through the liquid lines within the system.

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OPERATING INSTRUCTIONS

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SETUP AND OPERATION

WARNING

TURN OFF EXTERNAL POWER TO THE UNIT AND DISCONNECT POWER CORD FROM THE POWER SOURCE BEFORE PERFORMING ANY MAINTENANCE.

POTENTIALLY LETHAL LEVELS OF AC POWER EXIST IN THE ECU.

Note: These procedures must be accomplished by qualified personnel.

SETUP

- Perform a visual inspection to make sure all fasteners are secure and the unit is stable. Check for leaks that are evident by an accumulation of oil and that there are no loose, cracked or broken wires or other physical damage. Make all necessary repairs prior to powering the unit.
- Connect 208V/50-60Hz/3Ø power source to main disconnect/breaker.
- Make sure the unit is sufficiently grounded.
- Check for proper drainage of the condensate drain line.
- Check and remove any obstructions that may limit the air flow.
- Replace and/or close all access and service panels. Tighten fasteners as necessary.

OPERATION

Connect to a 208VAC source such as a generator or shore power using the connector provided.
At this time the green Power On Light on the remote control unit will light.
Turn the Mode Selector Switch to the desired function on the remote control unit. (HEAT, OFF, VENT, COOL).
Adjust the thermostat on the Control Panel to the desired temperature.
Check for air flow from the supply air duct.
If selecting the COOL function, after 30 minutes, check the sight glass. If the sight glass is clear and the discharge air is cool, the system is working properly.

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MAINTENANCE & REPAIR

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MAINTENANCE, PREVENTIVE by Operations Personnel

Item No.	Interval	Item to be Checked or Serviced	Procedure	"Not Fully Mission Capable If"
1	Before Operation and/or Daily	Coils (Condenser Coils)	Inspect for dirt or obstruction to coil. Remove obstruction or notify unit maintenance to clean as necessary.	Coil is obstructed or dirty to the point of impeding airflow.
2	Before Operation and/or Daily	Panels	Inspect panels for tight fit and/or loose hardware. Notify unit maintenance to repair as necessary.	Loose to the point that it will not deliver air to shelter.
3	Before Operation and/or Weekly	Condenser Fan	Check that fan is securely attached to motor. If loose, notify unit maintenance to secure it.	Fan is loose on motor shaft.
4	Before Operation and/or Daily	Condenser Fan	From the outside of the unit inspect for foreign object(s) in fan wheel.	Remove foreign object(s).
5	Before Operation and/or Weekly	Liquid Indicator	Inspect liquid indicator for sight glass cracks and note center indicator color. If cracked or center indicator color is YELLOW, notify unit maintenance.	Liquid indicator port cracked or center indicator color is YELLOW.

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Item No.	Interval	Item to be Checked or Serviced	Procedure	"Not Fully Mission Capable If"
6	Before Operation and/or Daily	Thermostat	Check the thermostat for damage to knobs or switches. Notify unit maintenance if damaged.	Damage that would prevent safe operation of equipment.
7	During Operation Weekly	Liquid Indicator	Inspect liquid indicator port for constant bubbles, foam or if center indicator color is YELLOW. If this condition occurs, notify unit maintenance.	Liquid indicator port shows constant bubbles foam or center indicator color is YELLOW.
8	During Operation Weekly	Condensate Drain Hose	When in cooling mode, check that water is dripping from the hose end. If water is dripping from any other place, notify unit maintenance.	
9	Monthly	Contactors	Check for worn or burned contact points.	Contacts are burned or worn.

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Item No.	Interval	Item to be Checked or Serviced	Procedure	"Not Fully Mission Capable If"
10	Monthly	Outside Surface of Unit	Inspect for cracks or dents in the frame or panels. Check for chipped or missing paint and any evidence or corrosion. Notify unit maintenance.	
11	Monthly	Data Plates	Check that identification plates are securely attached to unit and can be easily read. Notify unit maintenance to attach if loose or replace if hard to read.	

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MAINTENANCE, PREVENTIVE by Maintenance Personnel

NOTE: These procedures are to be performed by trained qualified technicians and should not be attempted without authorization.

Item No.	Interval	Item to be Checked or Serviced	Procedure	"Not Fully Mission Capable If"
1	Quarterly	Condenser Fan	Clean condenser fan as necessary and inspect for any cracks or damage. Replace if damaged.	Condenser fan is damaged or dirty enough to cause reduced airflow.
2	Semi-Annually	Wires, Cables, Harnesses and Electrical Connections	Open cover and panels as necessary to access component connections. Check wires, cables and harnesses for breaks, cuts or frayed insulation. Check that all electrical connections are secure. Tighten if necessary. If terminals are missing or damaged, repair or replace.	Any wire, cable or harness is damaged. Any electrical connection is loose, missing or damaged
3	Semi-Annually	Electric Box Wiring	Open cover and/or panel necessary to access electric box. Inspect for frayed or damaged insulation over visible portion of wires. Check for loose electrical connections. If frayed, damaged or loose connection, notify maintenance.	Any wire is frayed, damaged or loose connection.

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Item No.	Interval	Item to be Checked or Serviced	Procedure	"Not Fully Mission Capable If"
4	Semi-Annually	Electrical System Components	Open cover and panels as necessary to access components. Check components for damage or evidence of overheating. Replace any damaged components per appropriate procedure.	Electrical system component damaged or overheated.
5	Semi-Annually	Refrigeration System Components, Tubing and Fittings	Open cover and panels as necessary to access components. Check components for damage or evidence of refrigerant leak. Notify direct support maintenance if damaged or leak is suspected. Check components for damage or evidence of refrigerant leak. Notify direct support maintenance if damaged or leak is suspected.	Refrigeration system component damaged or leaking. Tubing or fittings are damaged or leaking.
6	Semi-Annually	Evaporator Coil	Check evaporator coil for any visible damage or evidence of leaking. Notify direct support maintenance if leaking or damaged. Clean any accumulated dirt from coil.	Coil leaking or damaged. Coil dirty enough to obstruct airflow.

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TROUBLESHOOTING GUIDE

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TROUBLE SHOOTING GUIDE

CONDITION	POSSIBLE CAUSE	CORRECTIVE ACTION
ECU will not start	Control power switch overload open	Reset overload by turning OFF/ON.
	Incorrect Power wiring	Swap any (2) power leads
	Wiring from power supply is loose or broken	Replace or repair faulty wiring
	Defective selector switch	Replace selector switch
Conditioned air is too cold	Thermostat is set improperly	Adjust thermostat
	Defective thermostat	Replace thermostat
	Defective heat contactors	Replace contactors
	Defective liquid line solenoid	Replace solenoid and/or powerhead
	Defective heater or wiring	Replace heater element or faulty wiring
	TXV is out of adjustment	Adjust or replace TXV and return to factory setting between 5°F and 12°F
Conditioned air is too warm	Thermostat is set improperly	Adjust thermostat
	Defective thermostat	Replace thermostat
	Defective contactors for the compressor, condenser fan motor, evaporator fan motor	Replace contactors
	TXV is out of adjustment	Adjust or replace TXV and return to factory setting between 5°F and 12°F
	Defective selector switch	Replace selector switch
	Defective 24VAC transformer	Replace 24VAC transformer
	Compressor not running	Check compressor motor. If burned out or shorted out, neutralize acid in the system and replace.
	Compressor not running	Check high pressure cutout switch and manually reset
	Compressor not running	Check low pressure cutout switch, check refrigerant charge
	Clogged coils	Check and clean condensing coils and evaporator coils
	Insufficient refrigerant charge.	Check refrigerant charge. If refrigerant charge is low, add refrigerant in liquid form. Check

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		and repair refrigeration system leaks.
	Filter / Drier clogged.	Replace filter / drier if it feels cooler at the outlet than at the inlet.
	TXV stuck open.	Replace TXV if the following symptoms are in evidence:
		a. Distributor lines frosted. b. Evaporator coil iced. c. Suction line excessively cold. d. Compressor slugging.
	TXV stuck closed.	Superheat too high, adjust or replace TXV and return to factory set to 5°F to 12°F
	Evaporator coil ices.	Check the following:
		a. Check circulating fan for proper shaft RPM and freedom of operation. b. Insufficient refrigerant charge. c. Check superheat. d. Check the operation of the Hot Gas Bypass Thermostat, Solenoid and Valve.
Discharge Pressure Too High	Condenser coil is dirty	Check condenser coil for dirt and blockage. Carefully clean as to not damage the fins.
	Condenser fan not operating	Check contactor, motor, wiring, and repair or replace as necessary
	Too much refrigerant in the system	Remove refrigerant and vacuum system to less than 500 microns before charging with proper amount of refrigerant
	Air or non-condensable in the refrigerant creating an exceptionally hot condensing coil.	Remove refrigerant and vacuum system to less than 500 microns before charging with proper amount of refrigerant
Discharge Pressure Too Low	Lack of refrigerant. Bubbles in the sight glass.	Locate and repair leak and recharge unit
	TXV sensing bulb is loose or	Securely attach sensing bulb or

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	dysfunctional causing extremely cold suction line	replace TXV and set superheat to factory spec 5°F to 12°F
	TXV dysfunctional and stuck in the open position	Replace TXV and set superheat to factory spec 5°F to 12°F
	Clogged evaporator coil causing low air flow	Clean coil and filter removing any obstruction
	High or low line voltage intermittent compressor operation.	Check and correct voltage supply.
	Faulty compressor motor. Intermittent compressor operation.	Replace compressor.
Suction Pressure Too Low	Lack of refrigerant. Bubbles in the sight glass.	Locate and repair leak and recharge unit
	TXV dysfunctional and stuck in the closed position	Replace TXV and set superheat to factory spec 5°F to 12°F
	Dirty or obstructed filter drier. Bubbles in the sight glass if downstream	Replace filter drier.
Compressor Fails To Start	Control circuit open. Contactor not holding closed	Check the following items for openings and determine cause:
		a. High-pressure cutout. b. Low pressure cutout. c. Compressor overload. d. Contactor e. Time delay relay
	Compressor thermal protection open or faulty	Allow compressor to cool for 30 to 60 minutes and restart or replace compressor if necessary
	High pressure switch is open	Manually reset high pressure switch
	Frozen compressor due to locked or damaged mechanism.	Replace compressor.
	Burned out motor.	Replace compressor.
Compressor Is Noisy	Excessive discharge pressure.	Refer to section "***Discharge Pressure Too High***"
	Lack of refrigerant oil	Replace compressor
	Broken internal components	Replace compressor
	Worn bearings	Replace compressor
	TXV stuck in the open position	Repair or replace the TXV

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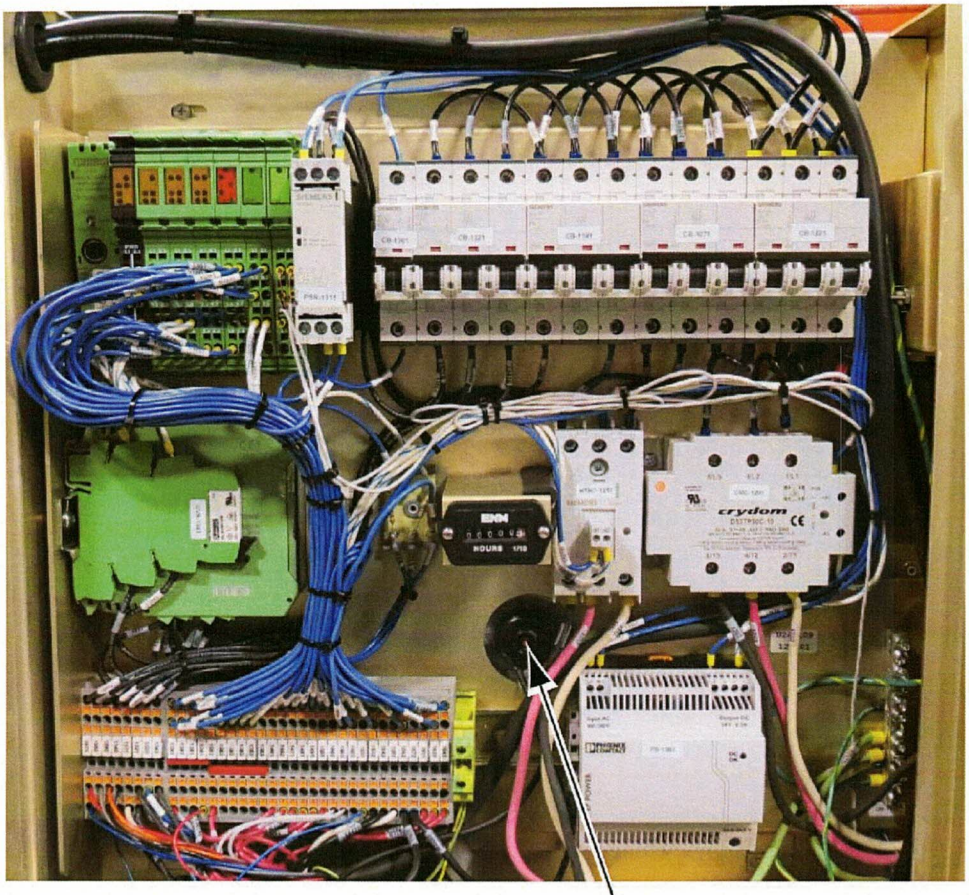
RESETTING THE HIGH TEMPERATURE CUT-OUT



ELECTRICAL CONTROL PANEL

HIGH TEMPERATURE CUT-OUT

Note: If the temperature reaches an unsafe level the HIGH TEMPERATURE CUT-OUT will trip. After resolving the cause of the high temperature the CUT-OUT will need to be manually reset. After resetting the CUT-OUT turn the MODE SELECTOR SWITCH to the OFF position before returning to the HEAT MODE. This will communicate to the software program that the Fault has been corrected.

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DRAWINGS & SCHEMATICS

11" x 17" fold-out schematics are located in the back of this manual.

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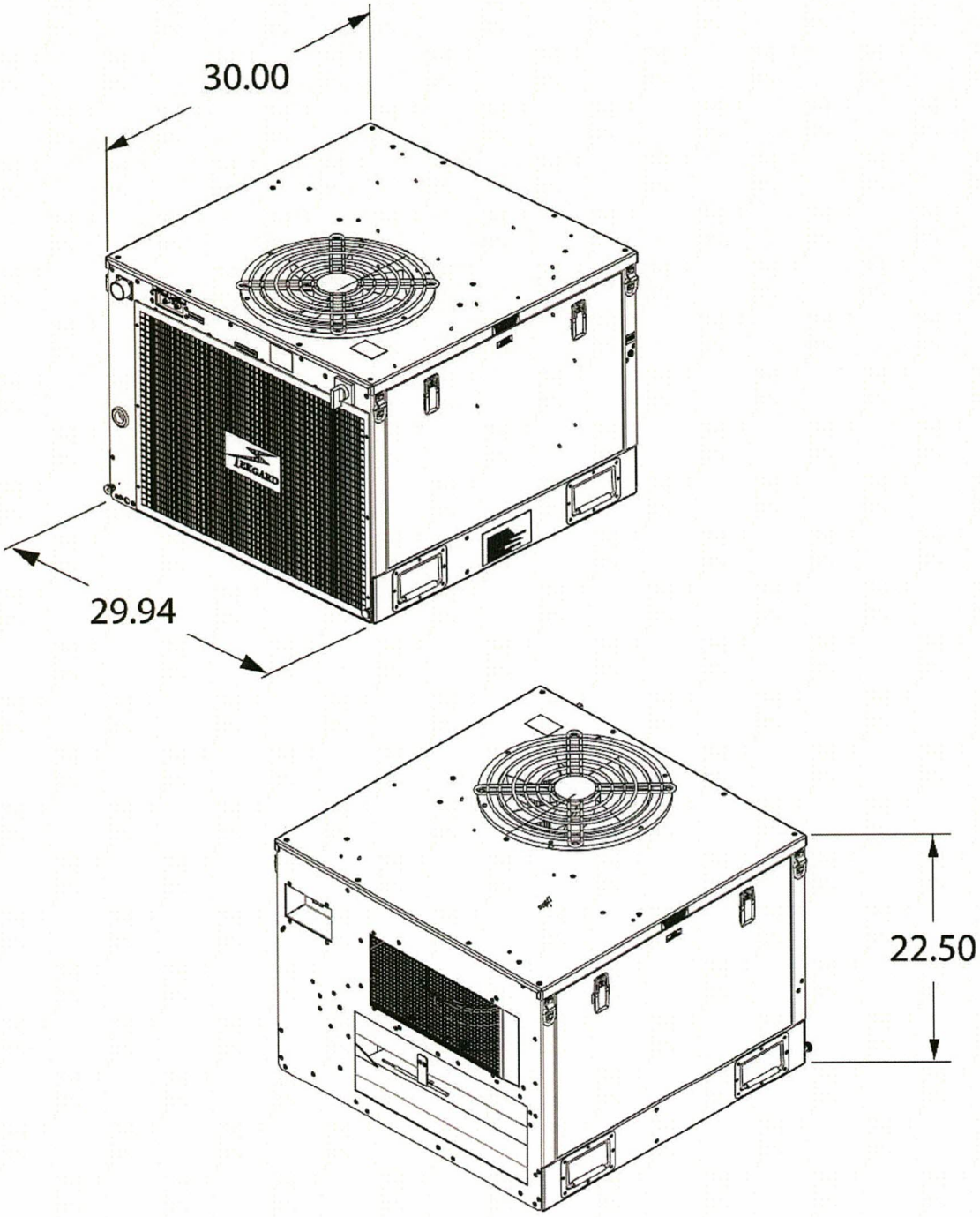
Dimensional Layout



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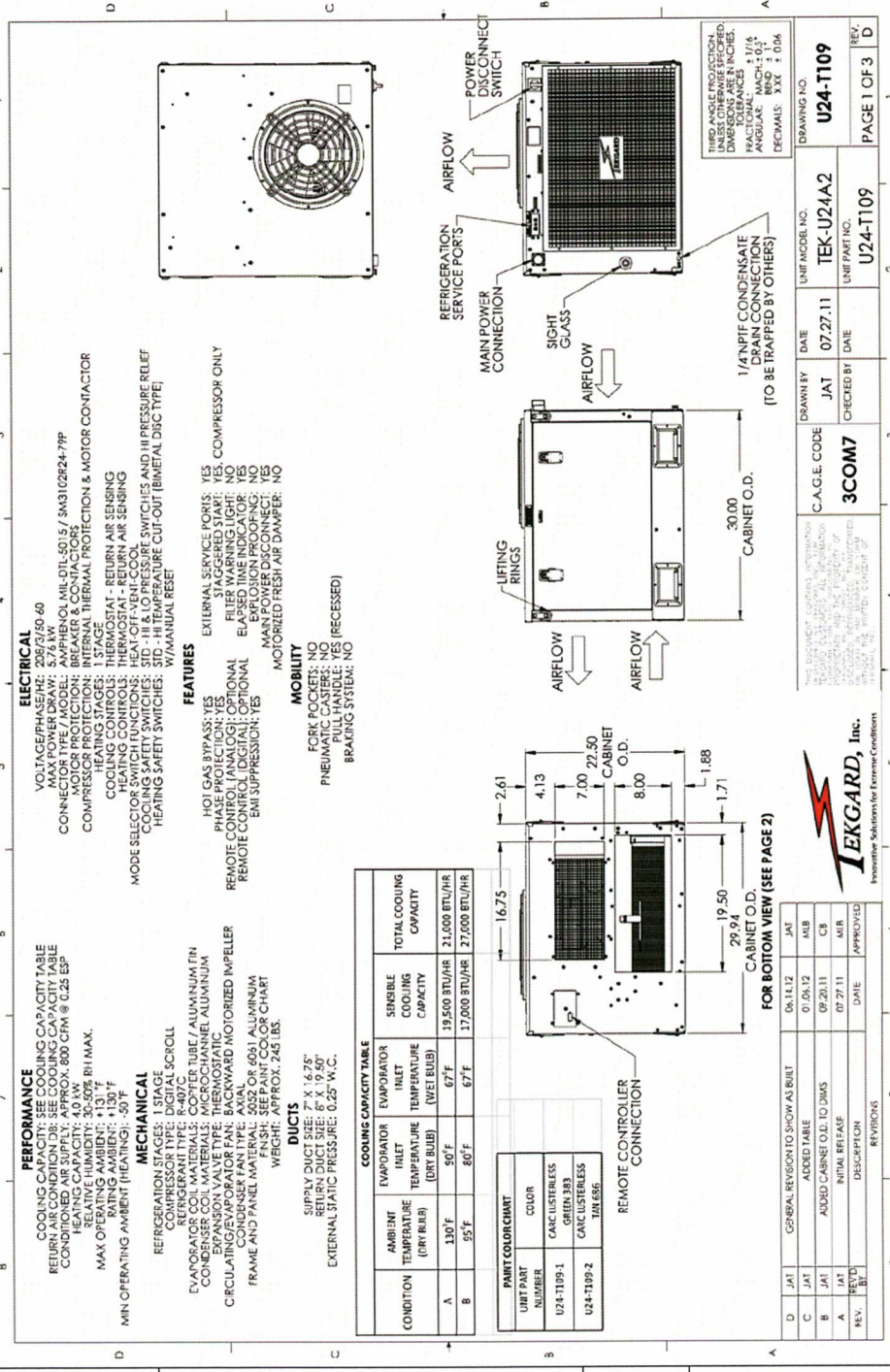
Interface Control Drawing (U24-T109-D) – Page 1


PERFORMANCE
COOLING CAPACITY: SEE COOLING CAPACITY TABLE
RETURN AIR CONDITION DB: SEE COOLING CAPACITY TABLE
CONDITIONED AIR SUPPLY: APPROX. 800 CFM @ 0.25 ESP
HEATING CAPACITY: 30,000 BTU MAX.
RELATIVE HUMIDITY: 30-50% RH MAX.
MAX OPERATING AMBIENT: +131 °F
RATING AMBIENT: +130 °F
MIN OPERATING AMBIENT (HEATING): -50 °F
MECHANICAL
REFRIGERATION STAGES: 1 STAGE
COMPRESSOR TYPE: DIGITAL SCROLL
REFRIGERANT TYPE: R-407C
EVAPORATOR COIL MATERIALS: COPPER TUBE / ALUMINUM FIN
CONDENSER COIL MATERIALS: MICROCHANNEL ALUMINUM
EXPANSION VALVE TYPE: THERMOSTATIC
CIRCULATING/EVAPORATOR FAN: BACKWARD MOTORIZED IMPELLER
FAN TYPE: AXIAL
CONDENSER FAN MATERIAL: SOLDIER 6061 ALUMINUM
FRAME AND PANEL MATERIAL: 20GA. G90 STEEL
FINISH: SEE PAINT COLOR CHART
WEIGHT: APPROX. 245 LBS.
DUCTS
SUPPLY DUCT SIZE: 7" X 16.25"
RETURN DUCT SIZE: 8" X 17.50"
EXTERNAL STATIC PRESSURE: 0.25" W.C.
ELECTRICAL
VOLTAGE/PHASE/HZ: 208/3/50-60
MAX POWER DRAW: 5.76 kW
CONNECTOR TYPE / MODEL: AMPHENOL MIL-DTL-5015 / SN3102R24-7PP
COMPRESSOR PROTECTION: INTERNAL THERMAL PROTECTION & MOTOR CONTACTOR
HEATING STAGES: 1 STAGE
COOLING CONTROLS: THERMOSTAT - RETURN AIR SENSING
HEATING CONTROLS: THERMOSTAT - RETURN AIR SENSING
MODE SELECTOR SWITCH FUNCTIONS: HEAT-OFF-VENT-COOL
COOLING SAFETY SWITCHES: STD - HI & LO PRESSURE SWITCHES AND HI PRESSURE RELIEF
HEATING SAFETY SWITCHES: STD - HI TEMP LIMIT FUSE CUT-OUT (BIMETAL DISC TYPE)
W/ MANUAL RESET
FEATURES
HOT GAS BYPASS: YES
PHASE PROTECTION: YES
REMOTE CONTROL (ANALOG): OPTIONAL
REMOTE CONTROL (DIGITAL): OPTIONAL
EMI SUPPRESSION: YES
EXTERNAL SERVICE PORTS: YES
STAGGERED START: YES, COMPRESSOR ONLY
FILTER WARNING LIGHT: NO
ELAPSED TIME INDICATOR: YES
EXPLOSION PROOFING: NO
MAIN POWER DISCONNECT: YES
MOTORIZED FRESH AIR DAMPER: NO
MOBILITY
FORK POCKETS: NO
PNEUMATIC CASTERS: NO
PULL HANDLE: YES (RECESSED)
BRAKING SYSTEM: NO
COOLING CAPACITY TABLE
CONDITION
AMBIENT TEMPERATURE (DRY BULB)
EVAPORATOR INLET TEMPERATURE (DRY BULB)
EVAPORATOR INLET TEMPERATURE (WET BULB)
SENSIBLE COOLING CAPACITY
TOTAL COOLING CAPACITY
A 130°F 90°F 67°F 19,500 BTU/HR 21,000 BTU/HR
B 95°F 80°F 67°F 17,000 BTU/HR 27,000 BTU/HR
PAINT COLOR CHART
UNIT PART NUMBER
COLOR
U24-T109-1 CARC LUSTERLESS GREEN 383
U24-T109-2 CARC LUSTERLESS TAN 686
REMOTE CONTROLLER CONNECTION
2.61
4.13
16.75
7.00
22.50
CABINET O.D.
8.00
1.88
1.71
19.50
29.94
CABINET O.D.
FOR BOTTOM VIEW (SEE PAGE 2)
AIRFLOW
AIRFLOW
AIRFLOW
AIRFLOW
LIFTING RINGS
30.00
CABINET O.D.
REFRIGERATION SERVICE PORTS
MAIN POWER CONNECTION
SIGHT GLASS
1/4" NPTF CONDENSATE DRAIN CONNECTION (TO BE TRAPPED BY OTHERS)
POWER DISCONNECT SWITCH
REV. BY DESCRIPTION DATE APPROVED
D JAT GENERAL REVISION TO SHOW AS BUILT 06.14.12 JAT
C JAT ADDED TABLE 01.06.12 MLB
B JAT ADDED CABINET O.D. TO DIMS 09.20.11 CB
A JAT INITIAL RELEASE 07.27.11 MLB
REVISIONS
THIRD ANGLE PROJECTION
UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES.
TOLERANCES:
FRACTIONAL: ± 1/16
ANGULAR: MACH: ± 0.5° BEND: ± 1°
DECIMALS: XXX ± 0.04
C.A.G.E. CODE 3COM7
DRAWN BY JAT DATE 07.27.11
CHECKED BY DATE
UNIT MODEL NO. TEK-U24A2
UNIT PART NO. U24-T109
DRAWING NO. U24-T109
PAGE 1 OF 3
REV. D
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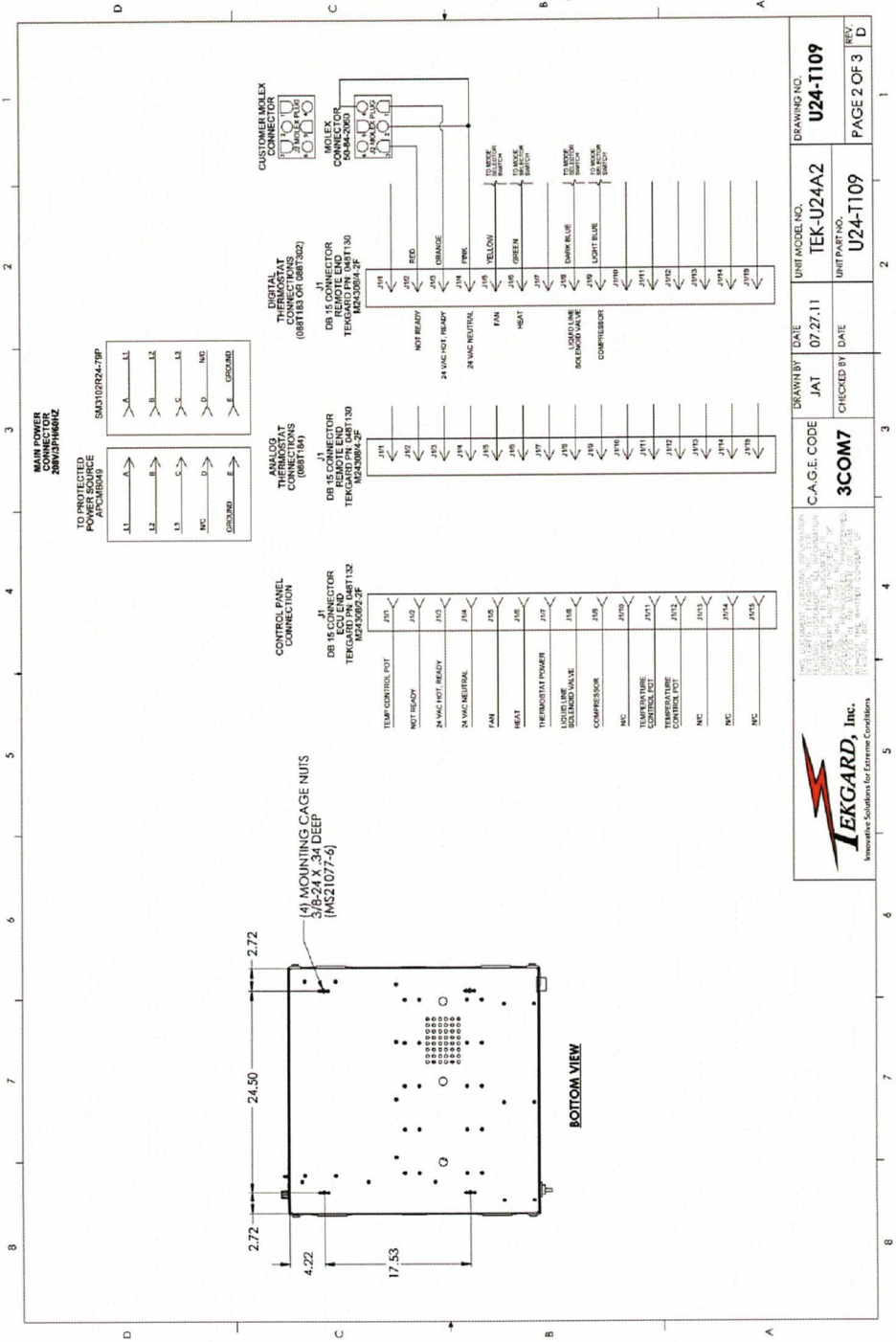
Interface Control Drawing (U24-T109-D) – Page 2



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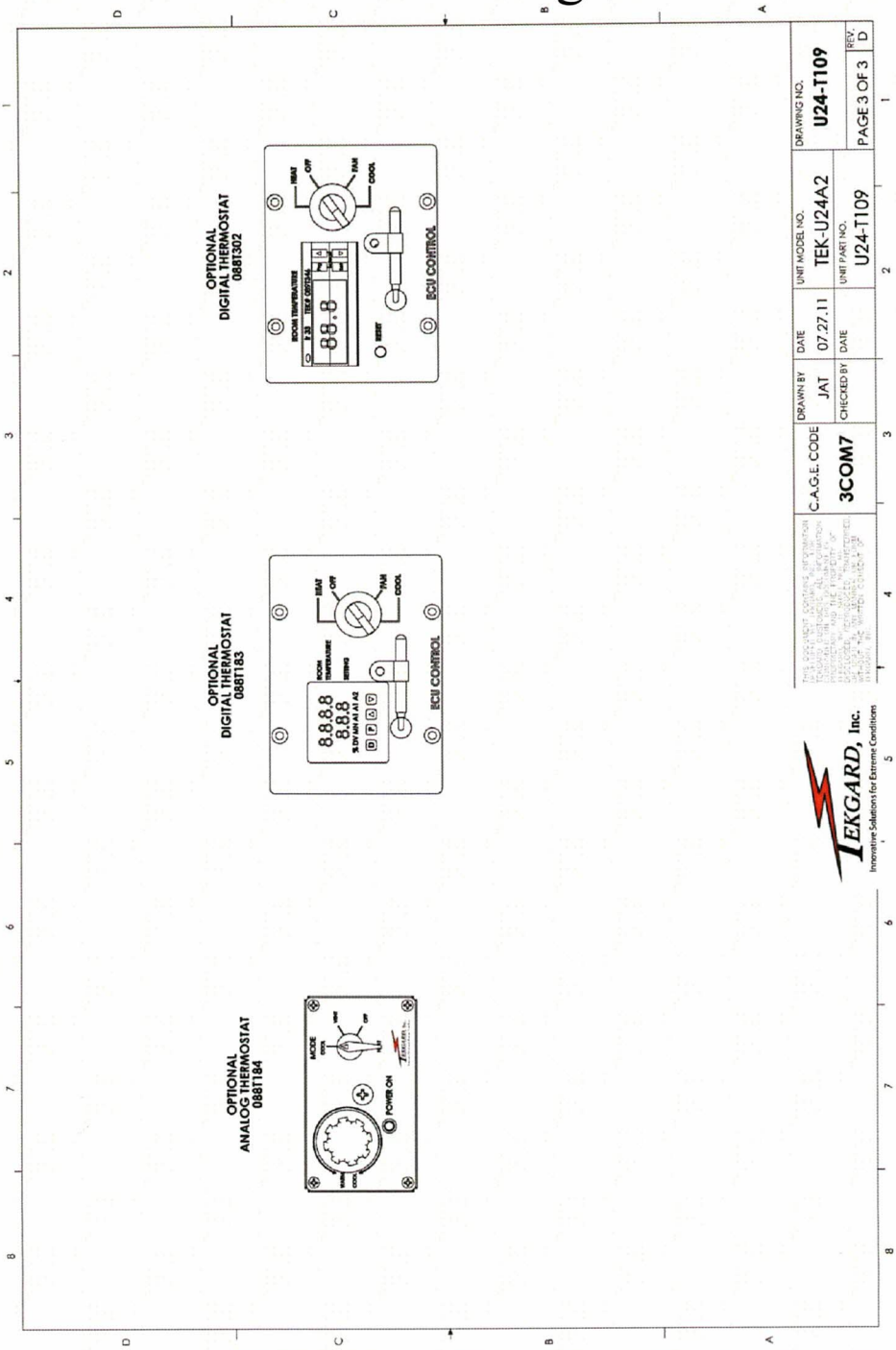
Interface Control Drawing (U24-T109-D) – Page 3



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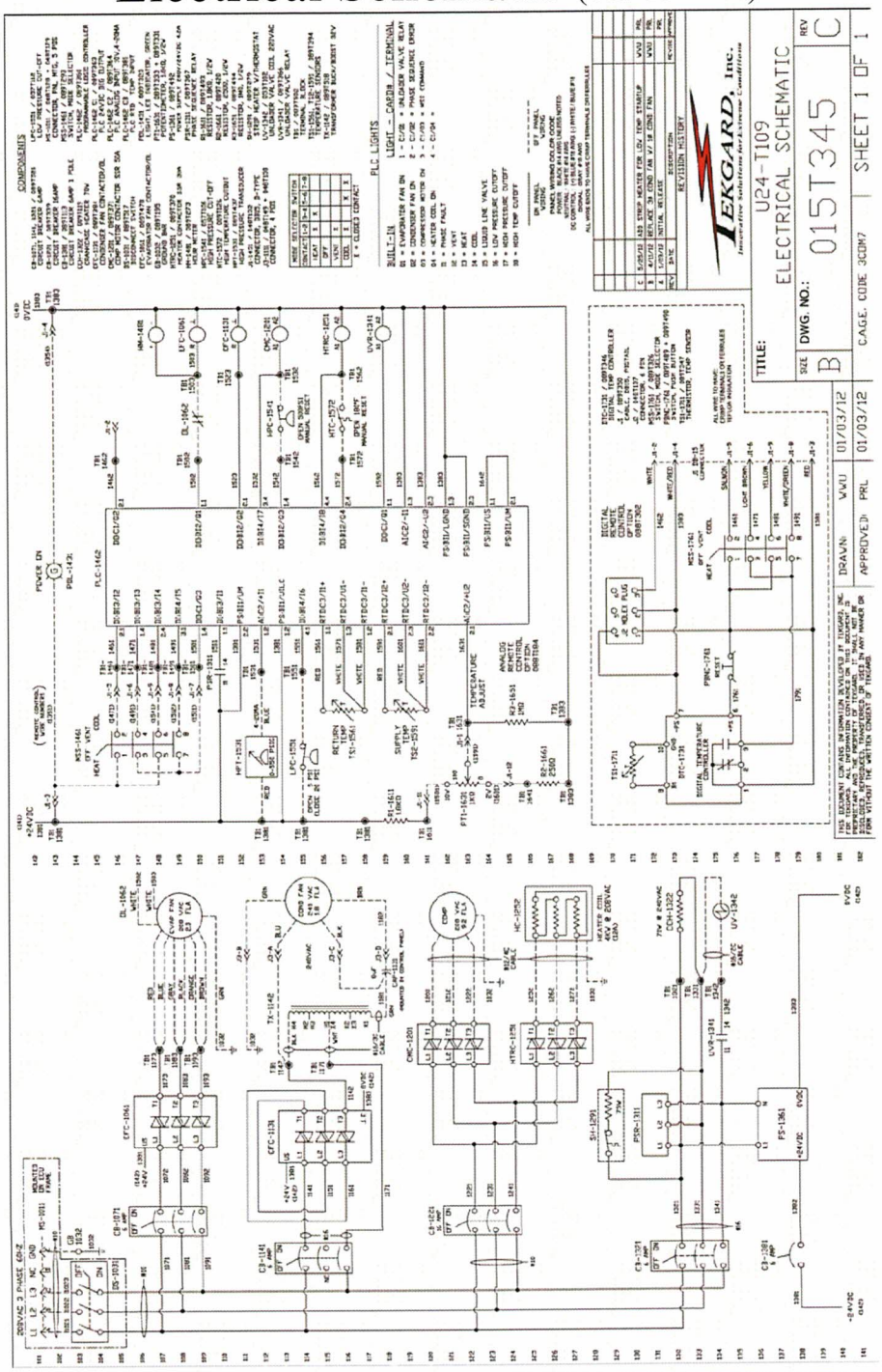
Electrical Schematic (015T345-C)



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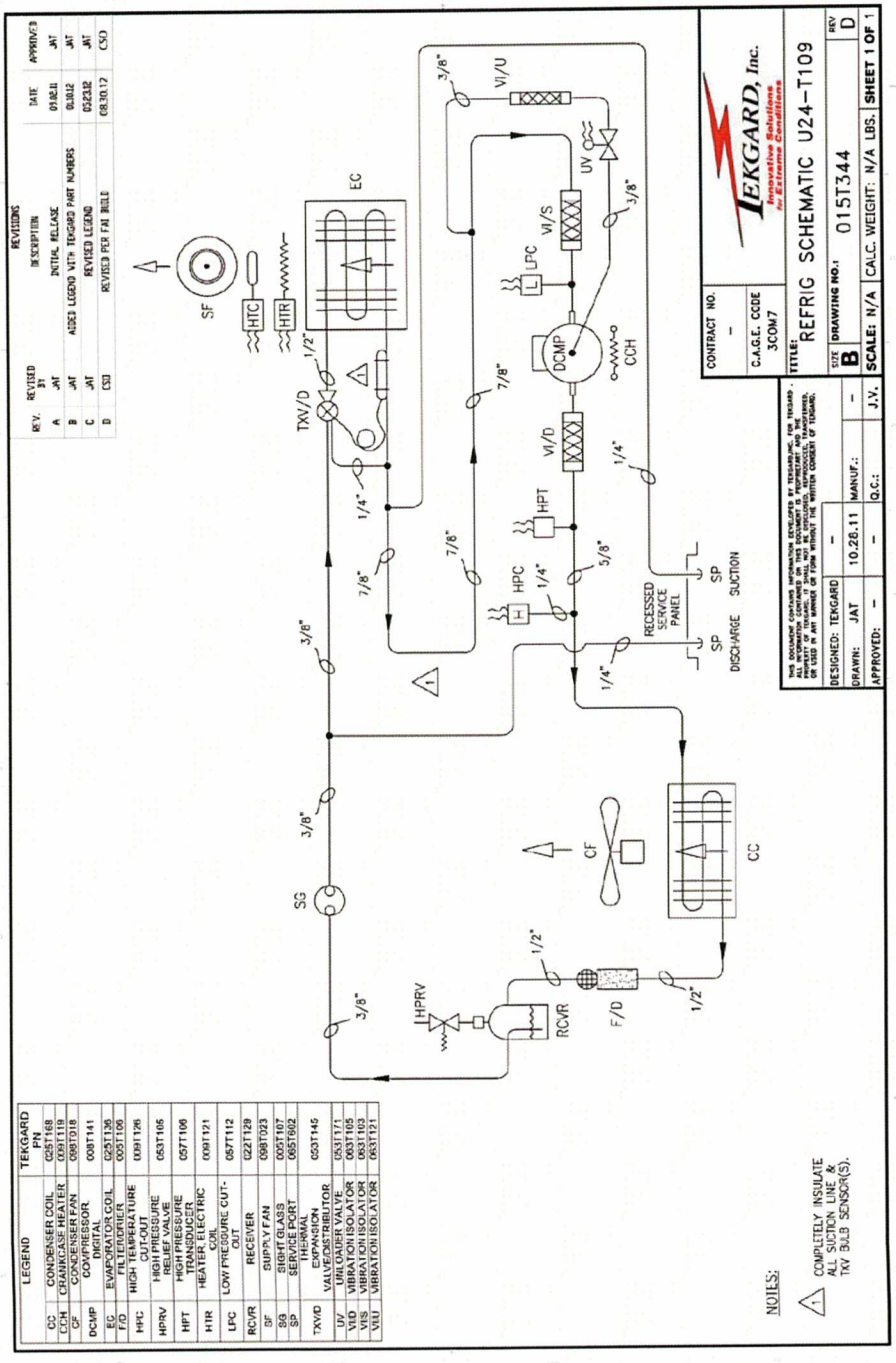
Refrigeration Schematic (015T344-D)



NOTE: A copy of this schematic is visible on the inside of the Enclosure Door Panel.

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REPLACEMENT PARTS LIST

The identified replacement parts are not necessarily based upon frequency of failure; they are also based on availability. Some replacement parts have lead times of 14 to 18 weeks.

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ITEM	PART	DESCRIPTION	SCHEM. REF.	QPU
1	098T018	FAN, CONDENSER	CF	1
2	098T023	MOTOR/FAN ASSY, TMK250-2-34, 208/3/60 FAN	SF	1
3	025T136	COIL, EVAPORATOR, 12 X 20.89	EC	1
4	025T168	COIL, COND, 18.75 FH X 24.25 FL, MICROCHANNEL	CC	1
5	009T121	HEATER, ELECTRIC COIL, 5.5KW, 208V, 3 PHASE	HTR	1
6	009T119	HEATER, CRANK CASE 70 WATTS @ 240 VOLTS 48" LEADS	CCH	1
7	053T105	VALVE, PRESS RLV, 555 PSIG	HPRV	1
8	063T121	VIBE, ABSORBER, 3/8" X 8 1/2",SS, FOR 3/8"OD	VI/U	1
9	053T145	VALVE, TXV, 3 X 3 4 ODF, 60" CAPILLARY TUBE	TXV/D	1
10	065T602	VALVE, ACCESS, 3/8 ODF X 3/16 OD, BRASS	SP	1
11	021T142	RING, LIFTING, 1200#, D-RING	*n/a*	1
12	005T106	FILTER DRIER, 3/8 ODF	F/D	1
13	005T107	SIGHT GLASS, 3/8 ODF	SG	1
14	019T164	TARP ASSEMBLY – CARC GREEN	*n/a*	1
15	021T202	GASKET, CUP, FOR COMPRESSION LATCH 62-40-251-3	*n/a*	4
16	021T201	LATCH, COMPRESSION, LIFT & TURN, SEALING	*n/a*	4
17	021T147	HANDLE, SPRING LOADED, RECESSED STEEL CASE	*n/a*	4
18	008T141	COMPRESSOR, SCROLL, DIGITAL, 208/3/60	DCMP	1
19	022T129	RECEIVER ASSEMBLY, 3"	RCVR	1
20	057T106	SWITCH, HI PRESSURE, SCREW ON, 500 PSI SCREW ON	HPT	1
21	063T103	ABSORBER, VIBRATION, 7/8 OD TUBING X6"	VI/S	1
22	063T105	ABSORBER, VIBRATION, 5/8 OD TUBING X 7-1/4	VI/D	1

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ITEM	PART	DESCRIPTION	SCHEM. REF.	QPU
23	089T517	SWITCH, DISC,CA20 A292-920 *FT2-V S0 V845/C11/D11	*n/a*	1
24	089T521	CIRCUIT BREAKER, 6A, 3 POLE, D-TRIP	CB-1071,CB-1141, CB-1321	3
25	089T339	CIRCUIT BREAKER, 16A	CB-1221	1
26	089T113	CIRCUIT BREAKER, 1 POLE, 6A C-TRIP	CB-1381	1
27	089T371	RELAY, SOLID STATE, 50 AMP	CMC-1201	1
28	089T195	KIT, BAR, GROUND, SQUARE D	GB-1032	1
29	089T370	RELAY, SOLID STATE, 30 AMP	HTRC-1251	1
30	089T273	HOUR METER, DC	HM-1481	1
31	**089T360**	**CONTROLLER, PLC INLINE, W/ETHERNET INTERFACE**	PLC-1462	1
32	089T363	PLC TERMINAL, 24VDC DIGITAL OUTPUT, ME	PLC-1462 C1	1
33	089T364	PLC TERMINAL, ANALOG INPUT, V OR I	PLC-1462 C2	1
34	089T381	PLC TERMINAL, RTD TEMP INPUT	PLC-1462 C3	1
35	089T492	POWER SUPPLY, 120-240VAC, 24VDC, 4.2A	PS-1361	1
36	089T367	RELAY, PHASE SEQUENCE	PSR-1311	1
37	089T366	RELAY, PLC, SPDT, 6A, 24 VDC	UVR-1341	1
38	089T502	TERMINAL SECTION, DIN RAIL MTG	TB1	1
39	009T126	CUT-OUT, KLIXON, OPENS AT 180°F, MANUAL RESET	HPC	2
40	088T183	ASSEMBLY, REMOTE CONTROL, DIGITAL, UGCS *(OPTIONAL)*	*n/a*	1
41	088T184	ASSEMBLY, REMOTE CONTROL, ANALOG *(OPTIONAL)*	*n/a*	1
42	088T302	ASSEMBLY, REMOTE CONTROL, DIGITAL *(OPTIONAL)*	*n/a*	1
43	057T112	SWITCH, LOW PRESSURE	LPC	1
44	021T168	KNOB, 1/4"-20 SS STUD, SS	*n/a*	2

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ITEM	PART	DESCRIPTION	SCHEM. REF.	QPU
45	230A130	DOOR ASSEMBLY, TUBING SIDE	*n/a*	1
46	230D136	GRILL, CONDENSER INLET	*n/a*	1
47	230A132	DOOR ASSEMBLY, CONTROL SIDE	*n/a*	1
48	089T394	SENSOR, RTD, 100 OHM, 6 INCH PROBE	*n/a*	1
49	048T128	CONNECTOR, ELECTRICAL	*n/a*	1
50	053T171	VALVE, UNLOADER, R-407C, DIGITAL SCROLL COMPRESSOR	UV	1

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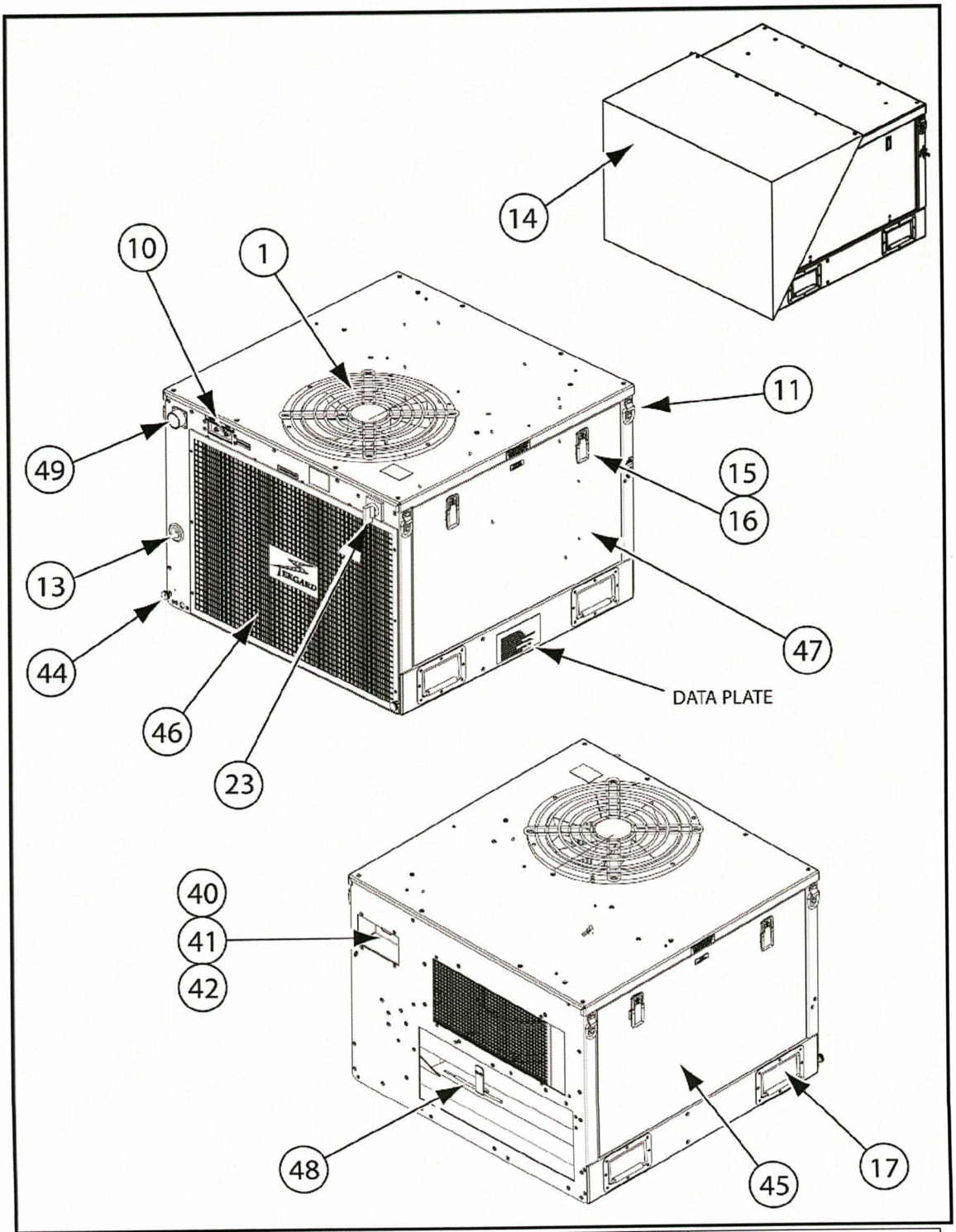

Cage Code 3C0M7	Model #: TEK-U24A2 P/N U24-T109	Rev. C	10 December 2012 Page 39 of 46

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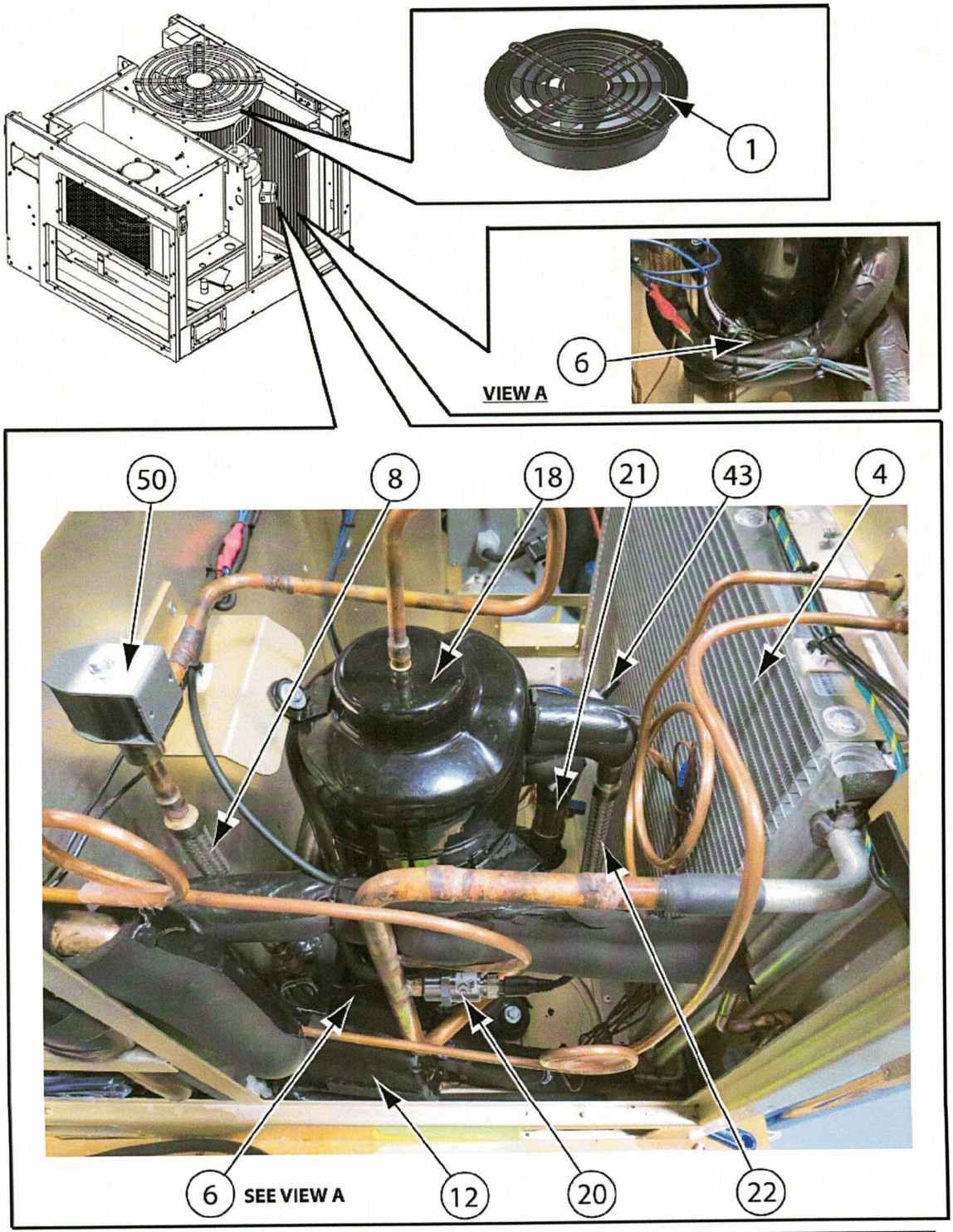

Cage Code 3C0M7	Model #: TEK-U24A2 P/N U24-T109	Rev. C	10 December 2012 Page 40 of 46

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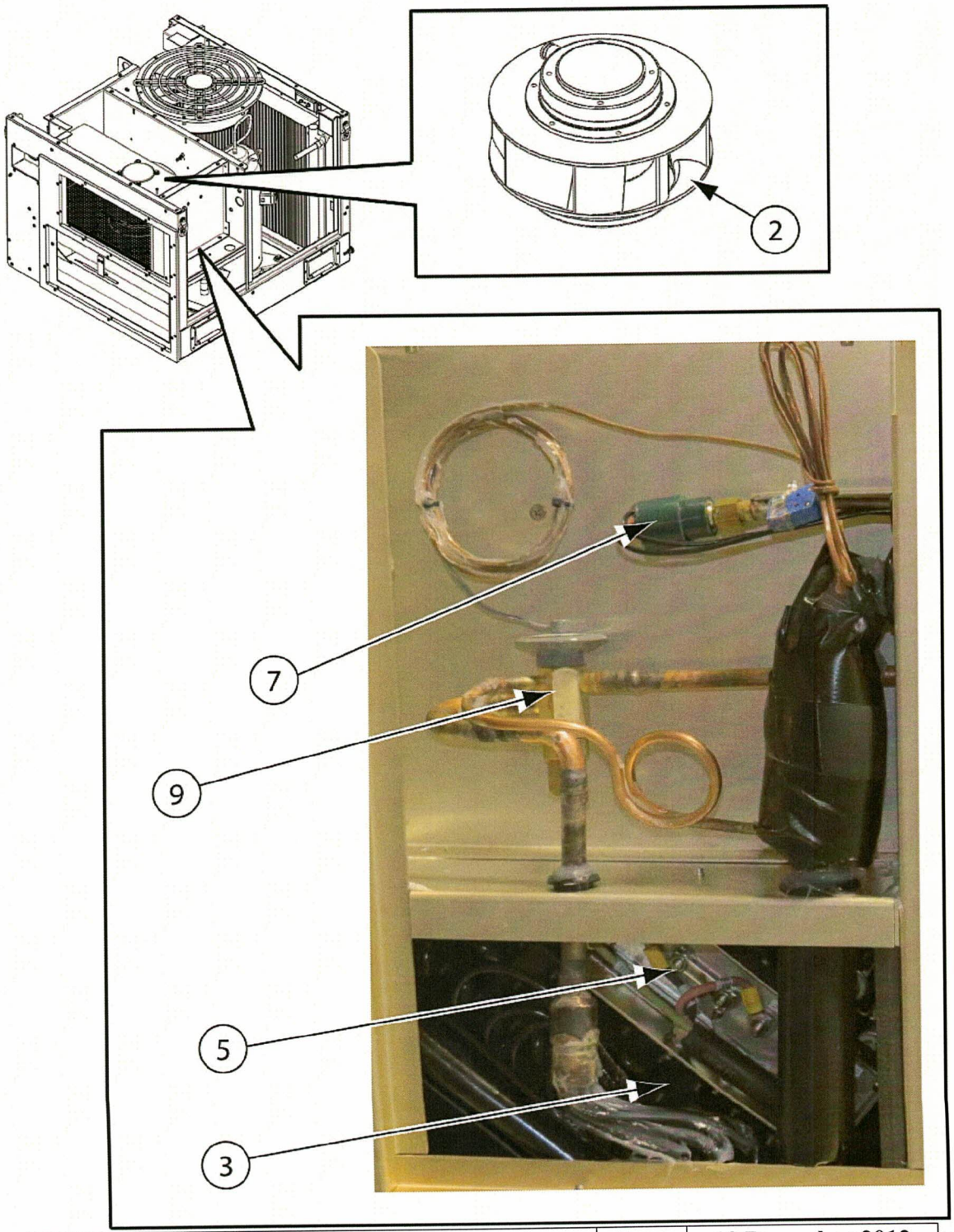

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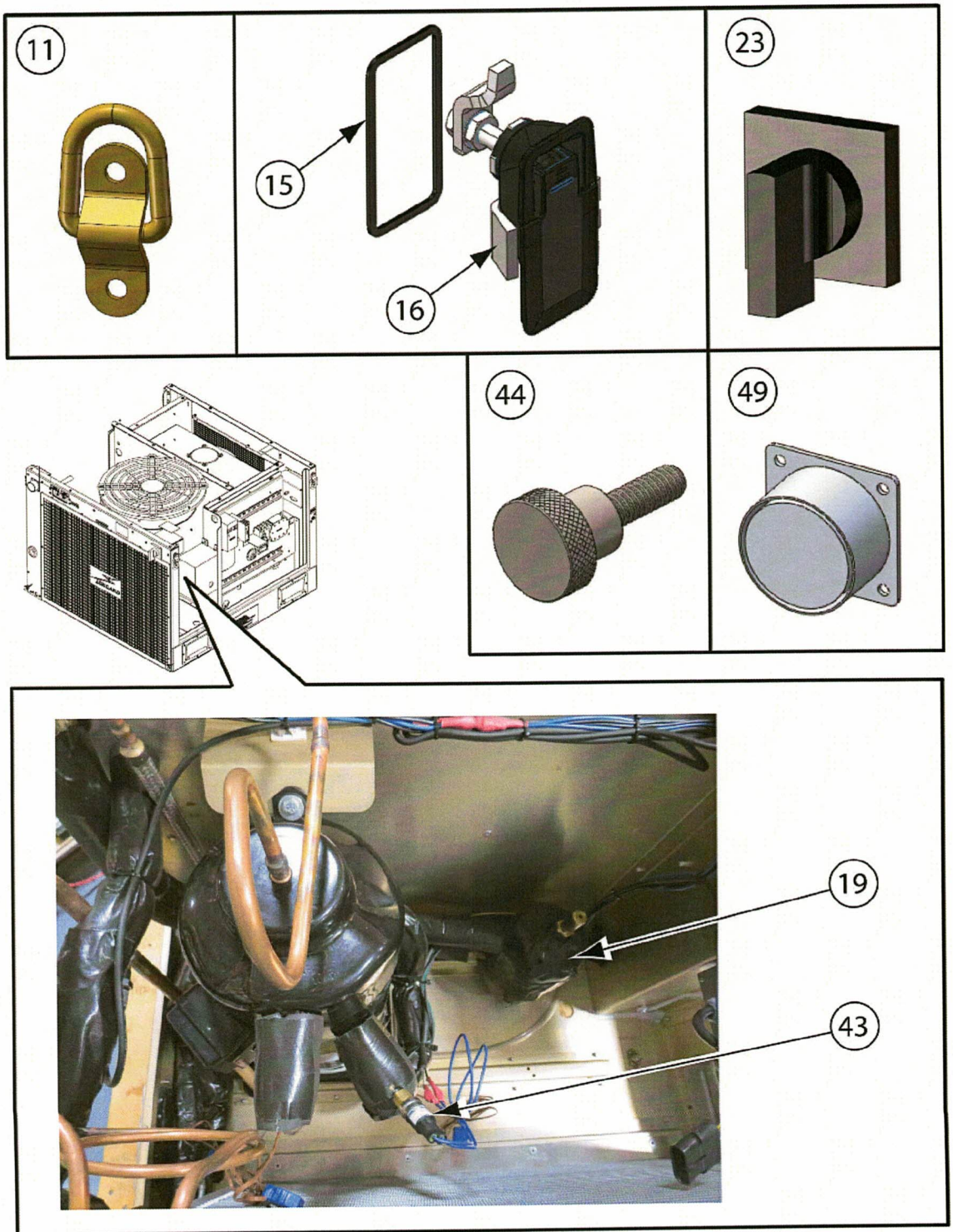

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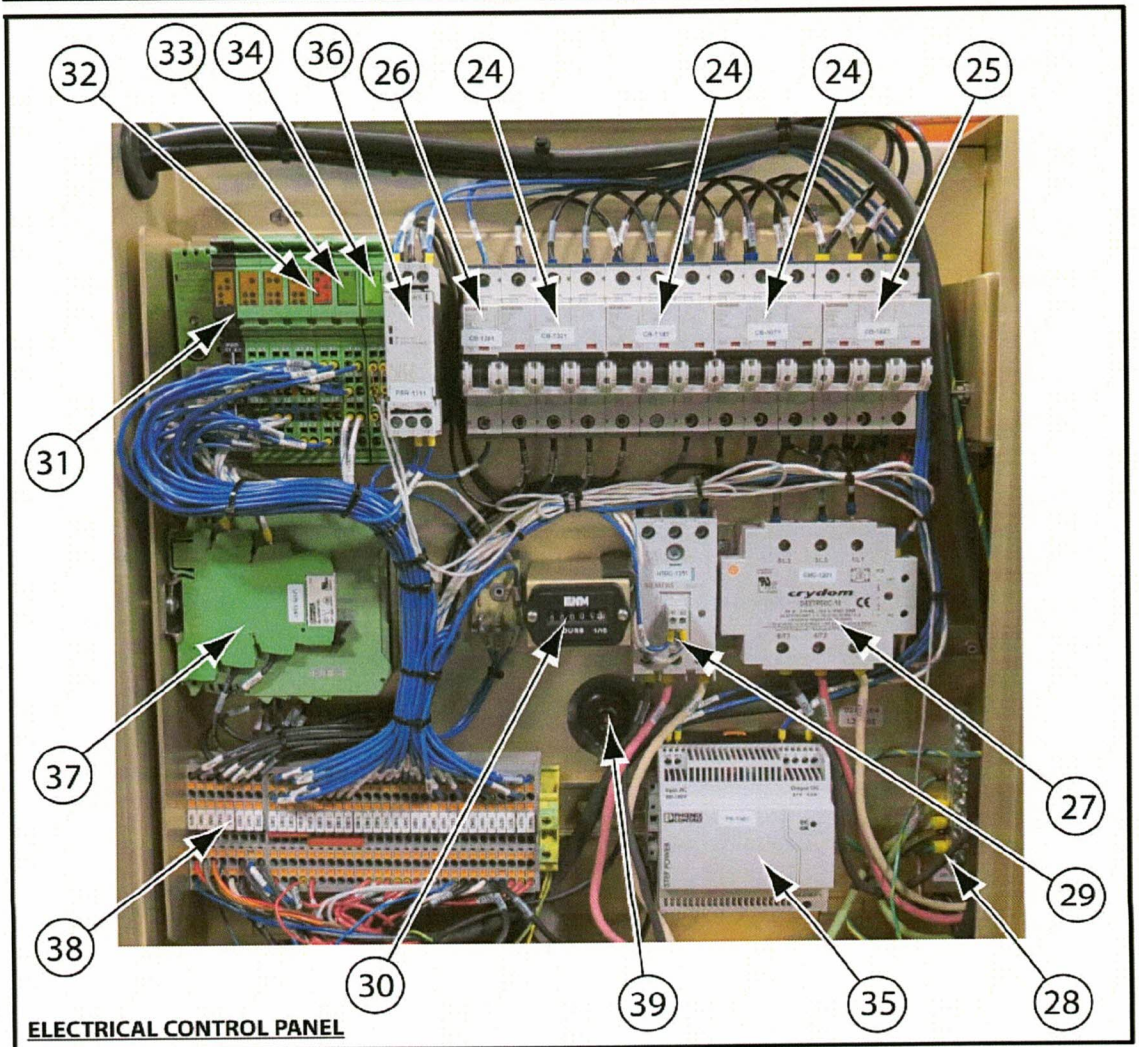
DIGITAL REMOTE CONTROL 40

ANALOG REMOTE CONTROL 41

DIGITAL REMOTE CONTROL 42

AVAILABLE REMOTE CONTROLS



ELECTRICAL CONTROL PANEL

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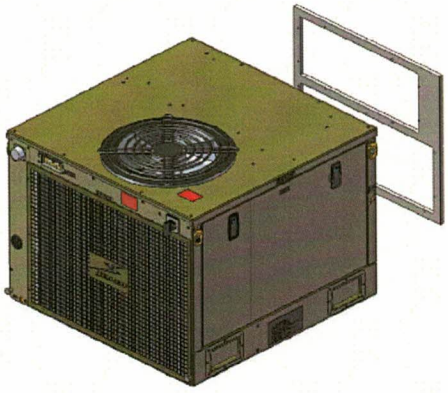
ORDERING CONFIGURATIONS

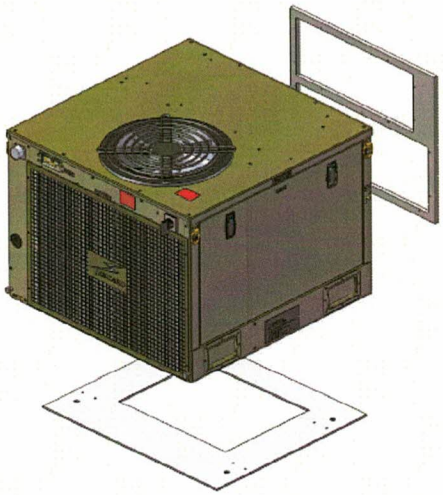
U24-T109-1

2 TON UNITARY - CARC GREEN
INCLUDES 042T170 MOUNTING HARDWARE KIT



U24-T109-1-1

2 TON UNITARY - CARC GREEN
INCLUDES 042T170 MOUNTING HARDWARE KIT,
WITH 1/2" FACE ADAPTER PLATE



U24-T109-1-1-1

2 TON UNITARY - CARC GREEN
INCLUDES 042T170 MOUNTING HARDWARE KIT,
WITH 1/2" FACE ADAPTER PLATE
AND BASE MOUNTING PLATE

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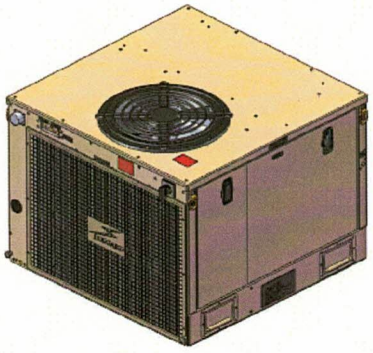
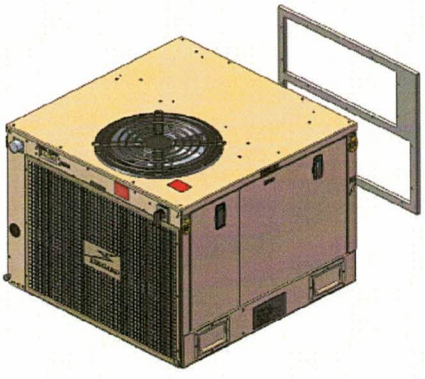
ORDERING CONFIGURATIONS



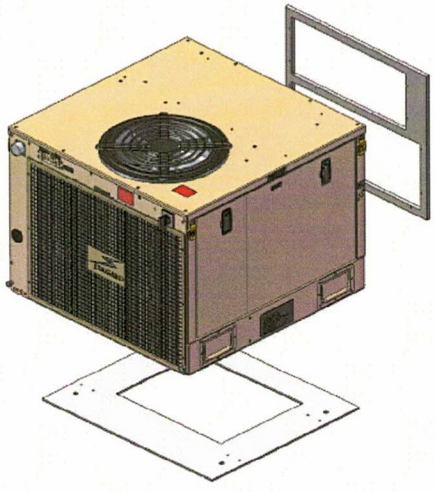
U24-T109-2

2 TON UNITARY - SAND, FLAT
INCLUDES 042T170 MOUNTING HARDWARE KIT



U24-T109-2-2

2 TON UNITARY - SAND, FLAT
INCLUDES 042T170 MOUNTING HARDWARE KIT,
WITH 1/2" FACE ADAPTER PLATE



U24-T109-2-2-2

2 TON UNITARY - SAND, FLAT
INCLUDES 042T170 MOUNTING HARDWARE KIT,
WITH 1/2" FACE ADAPTER PLATE
AND BASE MOUNTING PLATE

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